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TAXONOMY OF FOUR SPECIES OF EUCOSMINI (TORTRICIDAE) ASSOCIATED WITH *PELOCHRISTA COROSANA* (WALSINGHAM) INCLUDING A NEW SYNONYMY AND DESCRIPTION OF A NEW SPECIES

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ABSTRACT. *Pelochrista gelattana*, new species, is described from Alberta, Utah, and Wyoming. Reviews are included of *P. corosana* (Walsingham) and *P. argenteana* (Walsingham), its two closest congeners based on male genitalia. *Pelochrista idahoana* (Kearfott) is recognized as a junior synonym of *P. argenteana*. *Eucosma nuntia* Heinrich, a species that is similar in many respects to *P. corosana*, is also reviewed. Illustrations detailing the considerable intraspecific variation in wing color and/or male genitalia in the aforementioned taxa are provided, and current distributional information is summarized. A lectotype is designated for *P. argenteana*.

Additional key words: Olethreutinae, *Eucosma*, *argenteana*, *idahoana*, *nuntia*.

In Nearctic Olethreutinae, the lineage represented by the genera *Eucosma* Hübner and *Pelochrista* Lederer is comprised of approximately 180 recognized species, with the greatest diversity occurring in the arid and mountainous regions of western North America. There is a long history of confusion regarding species boundaries in the western fauna, the primary contributing factors being the common occurrence of similar looking taxa and the frequent presence of intraspecific variation in both wing color and genitalic characters. Recent progress in resolving some of these problems is reported in Wright (2005, 2007).

This paper is primarily a study of the variation occurring in *Pelochrista corosana* (Walsingham) and *P. argenteana* (Walsingham), western species that share a distinctive form of male genitalia. It was prompted by the recent discovery in southeastern Wyoming of a previously unrecognized member of this group, described below as *Pelochrista gelattana*, new species. A fourth name, *P. idahoana* (Kearfott), which refers to a taxon long considered to be a very close relative of *argenteana*, is recognized here as a junior synonym of *argenteana*.

Heinrich (1929) noted that some phenotypes of *P. corosana* could easily be mistaken for *Eucosma nuntia* Heinrich, based on forewing color and maculation, so a review of the latter species is included. These two taxa are similar not only in forewing pattern but even more strongly so in female genitalia. The male genitalia of

nuntia lacks the large spiniform seta at the anal angle of the cucullus associated with members of *Pelochrista*, but in other respects they are quite similar to those of the other species considered here. They also exhibit a range of variation in valval shape that is comparable to that in *argenteana*.

MATERIALS AND METHODS

This study was based on 497 adult specimens and 78 genitalia preparations from the following collections: American Museum of Natural History (AMNH), George J. Balogh, Canadian National Collection (CNC), University of California Berkeley (UCB), Loran D. Gibson, Mississippi Entomological Museum (MEM), John S. Nordin (JSN), United States Museum of Natural History (USNM), and Donald J. Wright (DJW). Forewing length (FWL) refers to the distance from base to apex (including fringe) and was measured to the nearest one tenth of a millimeter with a graticule mounted in a Leica MZ9s stereomicroscope. Aspect ratio (AR), defined as FWL divided by medial forewing width, is reported as the average of such values calculated for a small sample of specimens. The number of measurements supporting a particular statistic is indicated by n. Forewing pattern terminology follows Brown & Powell (1991) as modified by Baixeras (2002). The digital photographs were edited in Adobe Photoshop CS.

For stability of nomenclature I am designating as lectotype for *argenteana* a specimen selected for that

purpose by Obratzov. I did not see the specimen itself, but I did examine a 35 mm slide of the adult and a negative of the genitalia, both made by Obratzov. The included images of the lectotype were obtained by scanning those photographs.

SPECIES ACCOUNTS

Pelochrista corosana (Walsingham)

(Figs. 1–6, 19, 27)

Paedisca corosana Walsingham 1884:139, pl. IV, Fig. 6.

Eucosma corosana: Fernald [1903]:460; Barnes and McDunnough 1917:171; Heinrich 1923:127, Fig. 219; McDunnough 1939:47.

Pelochrista corosana: Powell 1983:35; Miller 1987:55.

Type. *Holotype*: ♂, Montana, Yellowstone R., Morrison, 1880, genitalia slide 11570, BMNH.

Discussion. In most specimens of *corosana* the forewing color is olive gray to olive brown (Figs. 3–6). One phenotype from Arizona has a reddish appearance (Fig. 1), and traces of this reddish hue are found in some specimens from New Mexico (Fig. 2). The principal forewing markings are dark olive gray to blackish brown and include an incomplete subbasal fascia running obliquely outward from dorsum to radius and a median fascia from mid costa to the pretoral portion of the dorsum. Occasionally, extensive suffusion of the forewing with dark coloration renders the fasciae barely discernable (Fig. 6). The median fascia is bordered distally by a narrow white line, a feature that is present even in the darkest specimens. Between the white line and the apex there generally is a semitriangular patch of dark scales that connects to a dark apical mark. Most individuals have a streak of white at the base of the fringe along the anterior two thirds of the termen. The ocellus, which is obscure but usually recognizable, is crossed by 3 to 4 black longitudinal streaks (often reduced to black dots) and is bordered basally and distally by variably expressed, silvery-gray, transverse bars. Forewing statistics: ♂ FWL 7.5–10.6 mm (mean = 9.4, $n = 31$), AR = 3.01, ♀ FWL 7.7–10.5 mm (mean = 9.3, $n = 19$), AR = 2.94.

Male genitalia (Fig. 19): Valva with neck long, apex nearly right-angled, ventral angle produced into triangular projection supporting one stout spine, ventral invagination broad and shallow, proximal margin of medial surface with well developed pulvinus; aedeagus long and narrow, vesica with 5–12 deciduous cornuti ($n = 15$). **Female genitalia** (Fig. 27): Papillae anales facing laterally and moderately setose; lamella postvaginalis well developed, with posterolateral corners semitriangular; sternum VII with strongly sclerotized and sometimes mildly raised posterior and lateral margins; ductus bursae with sclerotized patch incorporating a distinct fold posterior to juncture with ductus seminalis; corpus bursae with two large signa situated opposite one another on lateral surfaces of the membrane and projecting anteriorly into bursa, adjacent membrane variably wrinkled.

Distribution and biology. This moth is widely distributed in western North America and is quite common in the high plains east of the Rocky Mountains. I examined 203 adult specimens (155 ♂, 48 ♀) from Arizona, Colorado, Iowa, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, Texas, and Utah. Capture dates range from June through September. No larval food plant has been reported.

Pelochrista argenteana (Walsingham)

(Figs. 9–12, 17, 18, 20, 22, 26)

Paedisca argenteana Walsingham 1895:504, pl. XII, Fig. 13.

Eucosma argenteana: Fernald [1903]:460; Barnes and McDunnough

1917:169; Heinrich 1923:56, Fig. 216; McDunnough 1939:45.

Pelochrista argenteana: Powell 1983:35.

Eucosma idahoana Kearfott 1907:90; Barnes and McDunnough 1917:169; Heinrich 1923:56, Fig. 217; McDunnough 1939:45.

new synonymy:

Pelochrista idahoana: Powell 1983:35.

Types. *Paedisca argenteana*. *Lectotype* here designated (Figs. 17, 18): ♂, Loveland, Colorado, July 1891, Smith, genitalia slide 11566, BMNH. *Paralectotypes*: same data as lectotype (3 ♂, 4 ♀), BMNH. *Eucosma idahoana*. *Holotype* ♂, Blackfoot, Idaho, June 3, Arthur J. Snyder, genitalia slide CH 2 Dec. 1919, AMNH.

Discussion. The description of *idahoana* was based on a single male. Kearfott apparently was unaware that this taxon is nearly identical in appearance to *argenteana*. Heinrich (1923) recognized the similarity but treated *idahoana* as a distinct species based on what he considered to be a more olivaceous forewing color and a somewhat differently shaped cucullus. I compared photographs of the *argenteana* lectotype and the *idahoana* holotype and found no significant differences in forewing color. I examined a photograph of the slide prepared by Obratzov of the *argenteana* lectotype, Heinrich's slide of the *idahoana* holotype, and an additional 18 slides prepared from specimens with the *argenteana-idahoana* forewing pattern. The observed range of variation in the shape of the cucullus is illustrated in Fig. 22. Figure 22b resembles the *idahoana* holotype, Fig. 22e the *argenteana* lectotype. The full range of shapes was found in each of two local populations. I also examined 5 female genitalia preparations and found no significant variation. On these grounds I conclude that *idahoana* should be treated as a junior synonym of *argenteana*.

Differences in *argenteana* forewing appearance, which can be attributed to varying intensities and shades of color, are illustrated in Figs. 9–12. The pattern of maculation is stable and includes silvery-white longitudinal streaking on a straw-yellow background as follows: a narrow costal streak from distal end of fold to apex, a wider streak anterior to cubital vein from base to distal margin of discal cell, a thin line along distal one half of CuA2 terminating at tornus, a narrow streak along 1A+2A from base to tornus, and usually a narrow edging along the dorsal margin. The distal one half of the second streak expands to fill the discal cell and is divided longitudinally by a straw yellow bar that is variably overlaid with dark-brown to black scaling. In some specimens (Fig. 12) the white streaks are suffused with straw yellow to the point of being barely distinguishable. Between the cell and the termen there is variably expressed white streaking on the veins, with straw-yellow to brown scaling between the veins. The white streak on R4 is usually joined basally and distally to the costa by short white dashes. The termen is lined with a narrow white band, the distal scales of which have black to brown apices, producing a thin dark line along the base of the fringe. Fringe scales are white basally, shading to pale straw yellow distally. The brown longitudinal streaking varies considerably, but the dark terminal line is always present. Hindwing color varies from dark gray to grayish white (Figs. 9–11). In females it is nearly always grayish white; males exhibit the full range of variation. Forewing statistics: ♂ FWL 7.7–11.4 mm (mean = 9.9, $n = 88$), AR = 3.53, ♀ FWL 7.6–10.2 mm (mean = 8.7, $n = 22$), AR = 3.33.

The male genitalia (Figs. 20, 22) are quite similar in general structure to those of *corosana* (Fig. 19), the primary differences being in the shape of the cucullus (at least toward the lower end of the spectrum in Fig. 22) and in the basal projection on the medial edge of the valval opening. The latter is only a small bulge in *argenteana* vs. a fully developed pulvinus in *corosana*. There appears to be a connection between cucullus shape and hindwing color: males with the *idahoana* shape have dark gray hindwings, those with the *argenteana* shape grayish-white. The vesica has 5–11 deciduous cornuti ($n = 19$).

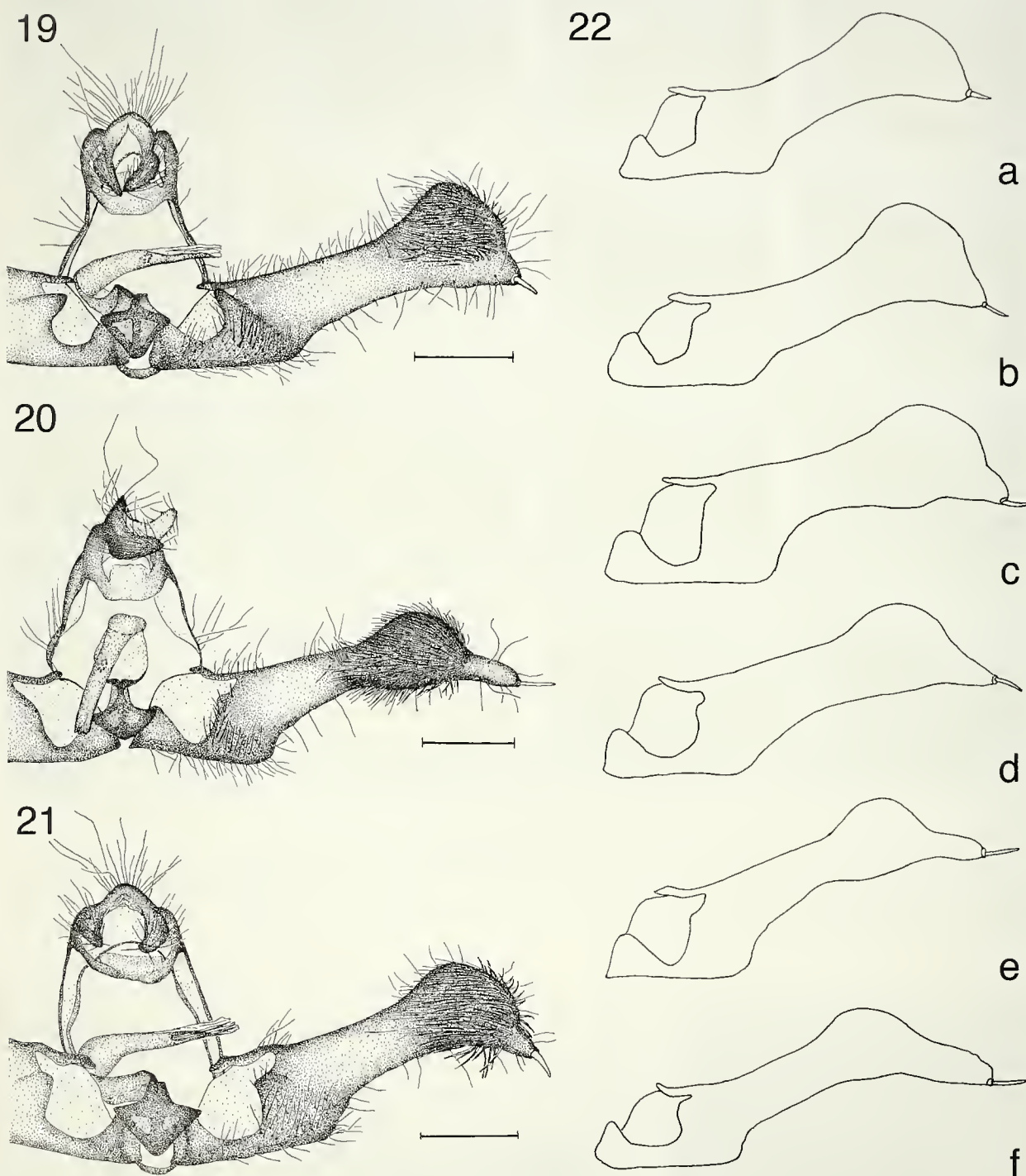
The most prominent feature of the female genitalia (Fig. 26) is the extensive sclerotization of the ductus bursae, which extends from ostium to corpus bursae and expands anteriorly along the membrane of the bursa into two triangular projections flanking the two signa. The papillae anales face laterally and are sparsely setose, the lamella postvaginalis has acute posterolateral corners, and the coneveally



FIGS. 1-16. Adults. 1-6, *P. corosana*. 1, ♂, Coconino Co., Arizona. 2, ♂, Lincoln Co., New Mexico. 3, ♀, Morton Co., Kansas. 4, ♀, Morgan Co., Colorado. 5, ♂, Weld Co., Colorado. 6, ♀, Gove Co., Kansas. 7-8, *P. gelattana*. 7, ♂ holotype. 8, ♂, Albany Co., Wyoming. 9-12, *P. argenteana*. 9, ♂, Albany Co., Wyoming. 10, ♂, Chaffee Co., Colorado. 11, ♀, Weston Co., Wyoming. 12, ♂, Albany Co., Wyoming. 13-16, *E. nuntia*. 13, ♂, Grand Co., Colorado. 14, ♂, Sweetwater Co., Wyoming. 15, ♂, Walla Walla Co., Washington. 16, ♂, Douglas Co., Nevada.



FIGS. 17-18. Lectotype, *P. argenteana*.



FIGS. 19-22. Male genitalia. 19, *P. corosana*, slide DJW1233. 20, *P. argenteana*, slide DJW1270. 21, *P. gelattana*, slide DJW1287. 22 a-f, *P. argenteana*, slides DJW1271, 1245, 861, 1250, 1270, 1251. Scale bar = 0.5 mm.

emarginated posterior margin of sternum VII has a ventral bulge that weakly shields the ostium.

Distribution and biology. I examined 196 specimens (171 ♂, 25 ♀) from Alberta, British Columbia, California, Colorado, Iowa, Montana, New Mexico, North Dakota, Oregon, South Dakota, Saskatchewan, Texas, Utah, and Wyoming. With the exception of one September record from Sioux City, Iowa, all were collected between 30 May and 28 July. No larval host has been reported.

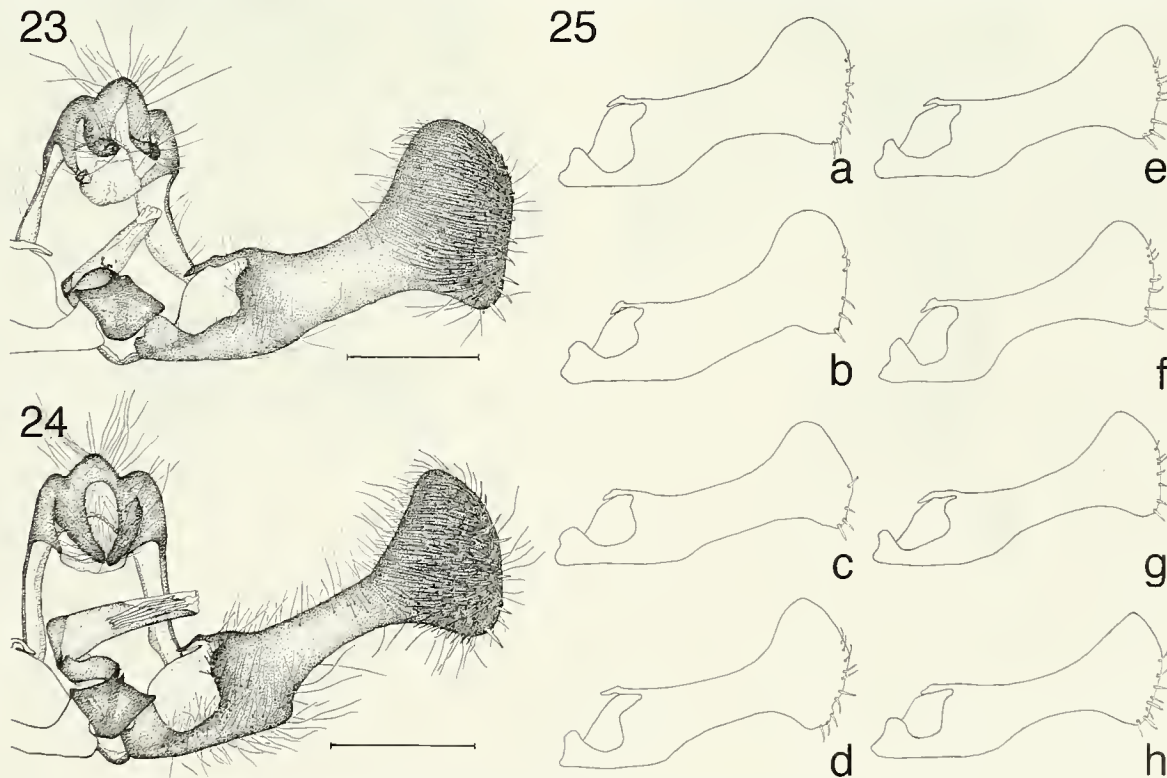
***Pelochrista gelattana*, new species**

(Figs. 7, 8, 21, 29)

Diagnosis. The shape of the male valva distinguishes *gelattana* from all Nearctic species of *Pelochrista* except *argenteana* and *corosana*. In most cases these three species are easily separated on the basis of forewing color and maculation. The *argenteana* phenotype with muted white forewing streaking (Fig. 12) might be confused with the non-speckled form of *gelattana* (Fig. 7), but *gelattana* lacks the black terminal line and has several small brown marks on the distal one half of the costa. The female genitalia of the three species are quite distinct (Figs. 26, 27, 29).

Description. *Head:* Frons and vertex pale yellowish tan; labial

palpus with basal segment white, medial surface and dorsal margin white, lateral surface tan, third segment concealed by long narrow scales on ventral margin of second segment; dorsal and lateral surfaces of antenna with pale tan scaling. *Thorax:* Dorsal surface concolorous with head; ventral surface creamy white, legs tan to creamy white, distal ends of tarsal segments ringed with white scales, the latter usually inconspicuous on hindleg. *Forewing* (Figs. 7, 8): ♂ FWL 10.2–13.4 mm (mean = 11.9, $n = 44$), AR = 3.4; ♀ FWL 12.7 mm, AR = 3.34 ($n = 1$); costa nearly straight, vertex acute, termen straight; dorsal surface uniformly pale yellowish brown, sometimes with very pale reddish-brown overtones, frequently with some blackish-brown tipped scales producing a sparsely speckled effect; male costal fold usually slightly darker than adjacent wing area; ocellus obscure; costal strigulae weakly defined by light brown to blackish-brown marks; fringe scales creamy white basally with very pale tan to brown apices. *Hindwing:* Gray brown to blackish brown, fringe white. *Male genitalia* (Fig. 21): Uncus semitriangular and dorsally setose; dorsolateral shoulders of tegumen moderately developed; socii of medium length, tapering distally, and moderately setose; gnathos a narrow band; aedeagus long and narrow, vesica with 3–8 deciduous cornuti ($n = 4$); valva with costal margin weakly concave, distal margin convex, ventral invagination broad and shallow, ventral angle produced into moderately long projection supporting one stout spine, cucullus with medial surface densely setose, margin of basal opening with weakly developed pulvinus supporting patch of short stout setae. *Female genitalia* (Fig. 29): Papillae anales large, facing ventrally, finely ridged transversely, and densely setose, setae on lateral margins of lobes long and curving ventrally, those near anal opening with hooked apices, apophyses posteriores short, length ca. 0.33 × that of apophyses anteriores; tergum VIII with long setae along posterior margin; lamella postvaginalis strongly developed, with semirectangular lateral extensions and a shallow central trough from ostium to medial invagination of posterior margin, long setae on lateral extensions and on membrane between sterigma and ventral extremities of tergum VIII; posterior margin of sternum VII with medial, triangular, posteriorly directed projection overlapping ostium; ductus bursae with small sclerotized patch midway between ostium and juncture with ductus seminalis; corpus bursae small, wrinkled, with one small spike-



FIGS. 23–25. Male *E. nuntia* genitalia. 23, slide DJW248. 24, slide DJW1663. 25 a–h, slides USNM70479, 70478, 70472, DJW806, 1747, 1748, USNM70474, DJW1665. Scale bar = 0.5 mm.

shaped signum and one larger thimble-shaped signum.

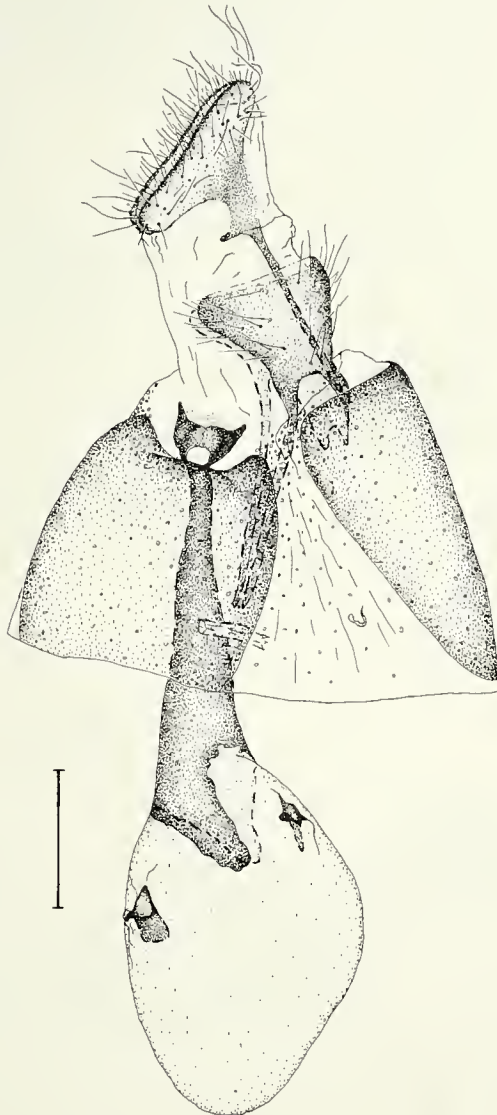
Holotype ♂: Wyoming, Albany Co., T15N R75W S29, W. side Celatt Lake, J. S. Nordin, 6 June 2004, 7250 ft., USNM.

Paratypes: ALBERTA: Mannyberries, Dom. Range Sta., D. F. Hardwick, 13 July 1951 (1 ♂, genitalia slide DJW 135S). UTAH: Daggett Co., 4 mi S. of Manila, C. J. Balogh, 20 July 1994 (1 ♀, genitalia slide DJW 711). WYOMING: Albany Co., T15N R75W S29, W. side Celatt Lake, J. S. Nordin, 7250 ft., 3 June 2004 (2 ♂, genitalia slide DJW 1112), 6 June 2004 (3 ♂, genitalia slides DJW 1256, 1257), 6 June 2006 (5 ♂), 12 June 2006 (3 ♂), 16 June 2005 (1 ♂), 17 June 2005 (4 ♂), 18 June 2005 (4 ♂), 19 June 2005 (1 ♂), 20 June 2005 (2 ♂), 21 June 2005 (5 ♂), 27 June 2005 (2 ♂), 29 June 2006 (5 ♂), 30 June 2005 (2 ♂), 1 July 2005 (3 ♂), 6 July 2005 (3 ♂), 7 July 2005 (1 ♂); 1 mi. E. of Laramie, 2217 Sky View Lane, J. S. Nordin, 8 June 1990 (1 ♂). Paratype depositories: AMNH, BMNH, CNC, Colorado State University, UCB, MEM, JSN, USNM, University of Wyoming, DJW.

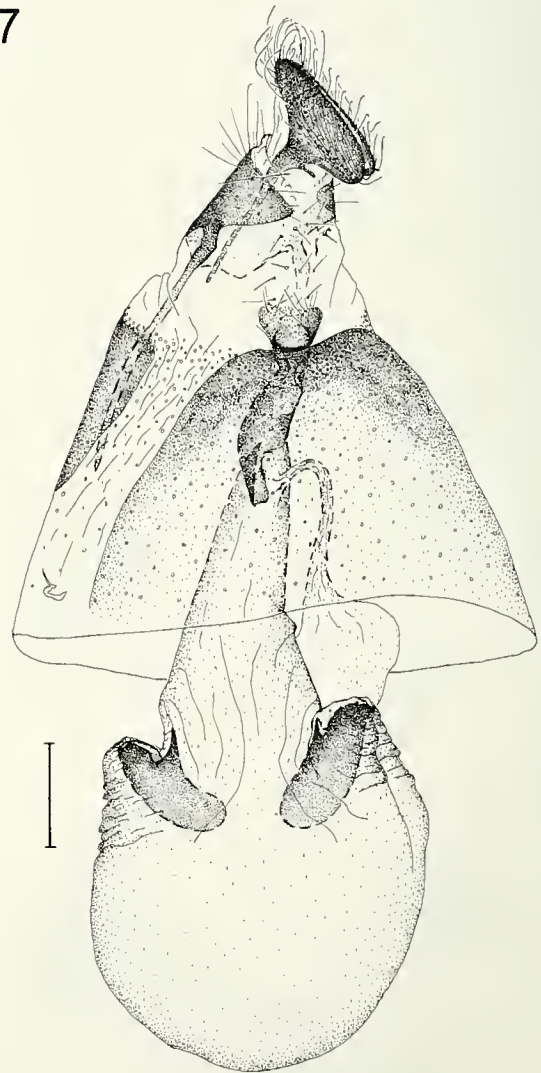
Etymology. The specific name derives from the type locality, Gelatt Lake, which is located ca. 15 miles WSW of the city of Laramie in Albany Co., Wyoming.

Distribution and biology. The type series consists of 46 males from southeastern Wyoming, one male from the southeast corner of Alberta, and one female from northeastern Utah. These specimens document a flight period extending from early June to mid July. The larval host is unknown. The type locality is noted for its alkali soil. The area surrounding Gelatt Lake has large stands of *Atriplex* (Saltbush), but the traps producing the

26



27



FIGS. 26-27. Female genitalia. 26, *P. argenteana*, slide DJW1246. 27, *P. corosana*, slide DJW1283. Scale bar = 0.5 mm.

gelattana specimens were placed near patches of *Gutierrezia* (Snakeweed).

Discussion. Three fourths of the *gelattana* specimens exhibited the nearly immaculate forewing illustrated in Fig. 7. The others presented varying amounts of dark speckling, the blackest of which is represented in Fig. 8. The one female specimen reported here is tentatively determined as *gelattana*. It was not collected in association with any males but is identical in appearance and general proportions to the *gelattana* holotype. Despite persistent efforts over two

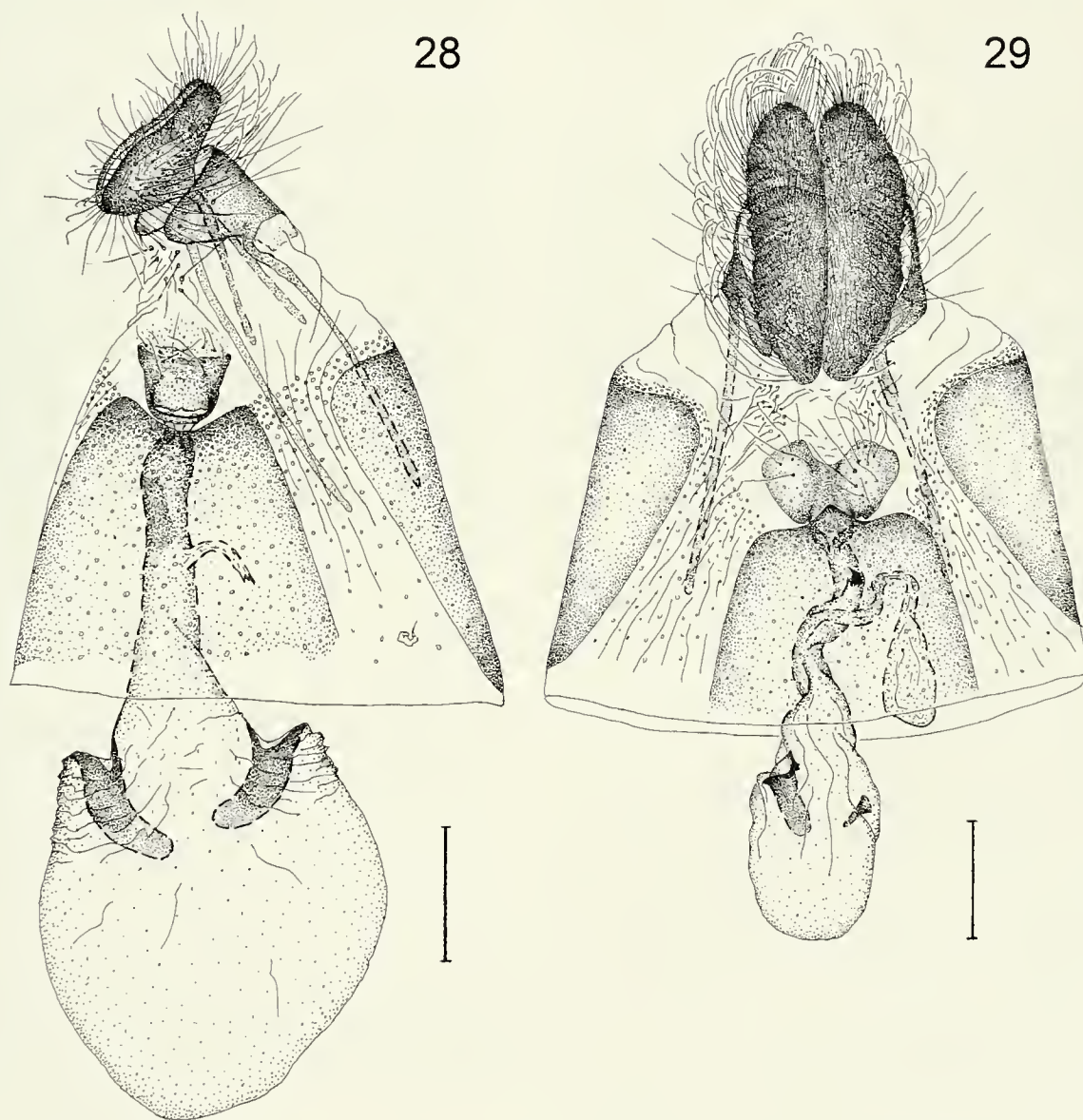
years, only males have been collected at the *gelattana* type locality.

Eucosma nuntia Heinrich

(Figs. 13–16, 23–25, 28)

Eucosma nuntia Heinrich 1929:10, Fig. 15; McDunnough 1939:47; Powell 1983:35.

Types. *Holotype*: ♂, Callao, Juab County, Utah, 17 June 1922, genitalia slide USNM 72811, USNM. *Paratypes*: same locality as holotype, 17 June 1922 (1 ♂), 23 June 1922 (1 ♂), USNM. [Heinrich (1929) reported one male and one female paratype, but the two specimens mentioned above are males, and both bear Heinrich's PARATYPE label. Heinrich erroneously reported the capture dates of



FIGS. 28-29. Female genitalia. 28, *E. nuntia*, slide DJW1664. 29, *P. gelattana*, slide DJW711. Scale bar = 0.5 mm

the holotype and the first paratype as "17-IV-22".]

Discussion. In forewing pattern, *nunitia* (Figs. 13–16) resembles *corosana*, but the color tends toward yellow brown rather than olive brown or olive gray. In many of the specimens from the Great Basin the fasciae are very weakly expressed. Similarities with *corosana* include a whitish streak along the distal margin of the median fascia and often some white scaling along the termen. Forewing statistics: ♂ FWL 6.3–10.2 mm (mean = 8.4, n = 29), AR = 2.72; ♀ FWL 8.5–9.7 mm (mean = 9.1, n = 5), AR = 2.93.

I examined 21 genitalia preparations (18 ♂, 3 ♀). Figures 23–25 show the variation in the shape of the valva: apex evenly rounded to acutely angular, neck wide to narrow, corner of sacculus broadly obtuse to nearly right angled, distal margin of cucullus with rounded to angular medial bend, and anal angle variably rounded with 2–3 moderately stout setae. The vesica has 9–15 deciduous cornuti. Figure 25g most closely resembles Heinrich's (1929, Fig. 15) illustration of the holotype. Figures 25a, b, e, f, g illustrate males from a single population at Walla Walla, Washington. The female genitalia are similar to those of *corosana*, but the sclerotization of the ductus bursae does not include a distinct fold.

Distribution and biology. I examined 39 adult specimens (34 ♂, 5 ♀) from Colorado, Nevada, Utah, Washington, and Wyoming. Capture dates range from 22 May to 15 August, with roughly two thirds of the records between mid June and mid July. No larval host has been reported.

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